REMEDIAL ACTION PLAN

PHASE I - FREE PRODUCT RECOVERY
L. E. CARPENTER AND COMPANY
WHARTON, NEW JERSEY

PREPARED FOR

L. E. CARPENTER & COMPANY
CLEVELAND, OHIO

PREPARED BY

RMT, INC.
SCHAUMBURG, ILLINOIS

FEBRUARY 1997

RMT INC.

RESIDUALS MANAGEMENT TECHNOLOGY, INC. — CHICAGO
999 PLAZA DRIVE = SUITE 370
SCHAUMBURG, IL = 60173-5407
847/995-1500 = 847/995-1900 FAX

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TABLE OF CONTENTS

Section 1

INTRODUCTION

1.1 Background

L.E. Carpenter manufactured vinyl wall coverings at the property located at 170 N. Main Street, in Wharton, New Jersey, during the period from 1943 until 1987. Manufacturing operations included the use of several solvents including xylene and methyl ethyl ketone (MEK). Solvent wastes generated during the manufacturing process were placed in on-site surface impoundments from 1963 until 1970. In 1980 and 1981, the New Jersey Department of Environmental Protection (NJDEP) conducted site investigations at the L.E. Carpenter & Company (L.E. Carpenter) site to document site conditions. Based on the results of the investigations, the NJDEP identified potentially impacted soil and groundwater throughout the property. In response to these findings, the NJDEP issued an ACO in 1982 which required L.E. Carpenter to delineate and remediate impacted soil and/or groundwater underlying the site. Based on the results of the subsurface investigations, the site was included on the National Priorities List (NPL) in 1985. As a result, the NJDEP issued an amended ACO in 1986 which required L. E. Carpenter to conduct a Remedial Investigation and Feasibility Study (RI/FS). The RI/FS activities were conducted during the period from 1989 through 1991 with some additional post-RI/FS activities being conducted in 1993. Based on the results of the RI/FS, a Record of Decision (ROD) was rendered in April 1994. Since that time, several engineering investigations and some free product and "hot spot" (DEHP/organic and inorganic impacted soils) removal activities have been conducted. The results of the investigations and selected site remedy are summarized in the following sections.

1.2 Site Hydrogeology

Three hydraulically connected hydrostratigraphic zones are present below the site. These zones are identified by previous investigators as the shallow, the intermediate, and the deep zones. The shallow zone extends from the water table (approximately 3 to 5-ft bgs) to a depth of approximately 30-ft bgs; the intermediate zone from approximately 30 to 50-ft bgs; and the deep zone extends from the base of the intermediate zone to bedrock (approximately 170-ft bgs). The shallow zone generally consists of fill material to a depth of approximately 5 to 10-ft bgs underlain by a continuous silt or clay aquitard approximately 5 to 10- ft in thickness. A confined sand aquifer is located beneath the fill material and aquitard. The groundwater flow direction in the shallow zone is generally to the east.

1.3 Investigation Findings

The results of chemical analyses performed on soil and groundwater samples collected from soil borings and monitoring wells located throughout the eastern section of the property identified the presence of toluene, ethylbenzene, xylene (TEX) and diethyl hexyl phthalate (DEHP). The results indicate that the

bulk of the free product (TEX/DEHP) is located within the fine grained shallow aquifer zone (fill materials) . Historical groundwater quality data indicate that the free product plume is relatively stable and that discrete units or slugs of dissolved contamination, primarily ethylbenzene and xylenes, have been intermittently migrating within the shallow aquifer zone in a easterly direction off-site. However, there are no current indications that the adjacent surface water bodies (i.e., the Air Products drainage channel or the Rockaway River) or the intermediate aquifer zone have been impacted.

1.4 Selected Site Remedy

Based on these findings, the selected site remedy, as designated in the ROD, was to be implemented using a phased-approach: **Phase I** - Free product removal, "hot spot" soil removal, and enhanced biological treatment of impacted soils (the biological treatment component would begin only after the free product has been removed); and **Phase II** - Groundwater extraction with biological treatment and reinfiltration (the reinfiltrated groundwater would be enhanced with nutrients to stimulate in-situ biological activity). RMT has been contracted by L. E. Carpenter to address free-product removal under the Phase I requirements of the ROD.

Section 2
PROPOSED FREE-PRODUCT RECOVERY SYSTEM

How Long

2.1 Background

The proposed free product recovery system consists of a recovery well network distributed throughout the eastern section of the property and the application of Enhanced Fluid Recovery (EFR) techniques. EFR systems actively recover free product from shallow aquifers using a vacuum truck that applies a high vacuum (approximately 22-inches of mercury) to individual recovery wells. The applied vacuum removes total fluids (i.e., groundwater, free product, and vapors) and facilitates recovery by actively drawing free product towards the well. The added benefits to using EFR at the L.E. Carpenter site are:

- The existing monitoring wells located within the product plume can be used as recovery wells;
- Easily implementable because the technology uses readily available equipment such as a vacuum truck and PVC materials for constructing the slip-over manifold;
- Applies a vacuum to the vadose zone which extracts adsorbed-phase volatile organic compounds (VOCs) such as ethylbenzene, toluene, and xylenes;
- Induces air flow into the vadose zone, adding oxygen which stimulates aerobic biodegradation of organic compounds such as DEHP which are not readily volatilized;
- Recovery wells may be re-used for Phase II remedial activities;
- The recovery wells will be used to further define product thicknesses ; and
- Fluids are contained in a vacuum truck and transported off-site for recycling, thereby eliminating on-site storage issues.

2.2 Recovery-Well Network

The proposed recovery well network consists of 30 product recovery wells; 25 wells located throughout the eastern section of the property in areas that have been identified as having measurable free product and 5 wells located downgradient of the plume along the drainage channel to intercept the migration of free product into adjacent surface waters. Each recovery well borehole will be advanced to a depth of approximately 10-ft below ground surface (bgs) using 6.25-inch inner-diameter (ID) hollow-stem augers. The recovery wells will be constructed using 4-inch ID Schedule 40 polyvinyl chloride (PVC) riser and a 5-ft screen interval and 0.010-inch factory-cut slots. A sand-filter pack will be placed to a level approximately 2-ft above the top of the screen interval. A bentonite seal will be placed to complete the annular seal to grade. The top of casing will be set approximately 6-inches above grade level and covered with a cap. All required state well permits will be completed and submitted. Actual well construction may be adjusted in the field depending on geologic conditions (i.e., high water table and/or

thicker fill layer). A site plan showing the locations of the proposed recovery-well network layout is presented in Figure 1 and well construction details are presented in Figure 2. Specifications for well installation are included in Appendix A.

2.3 Well Development

Once well installation activities have been completed, each recovery well will be developed until the extracted groundwater is relatively clear and free of particulate matter. Development will be conducted using a pneumatic or mechanical pump. All development water will be containerized pending off-site disposal. Specifications for disposing of development water are included in Appendix A.

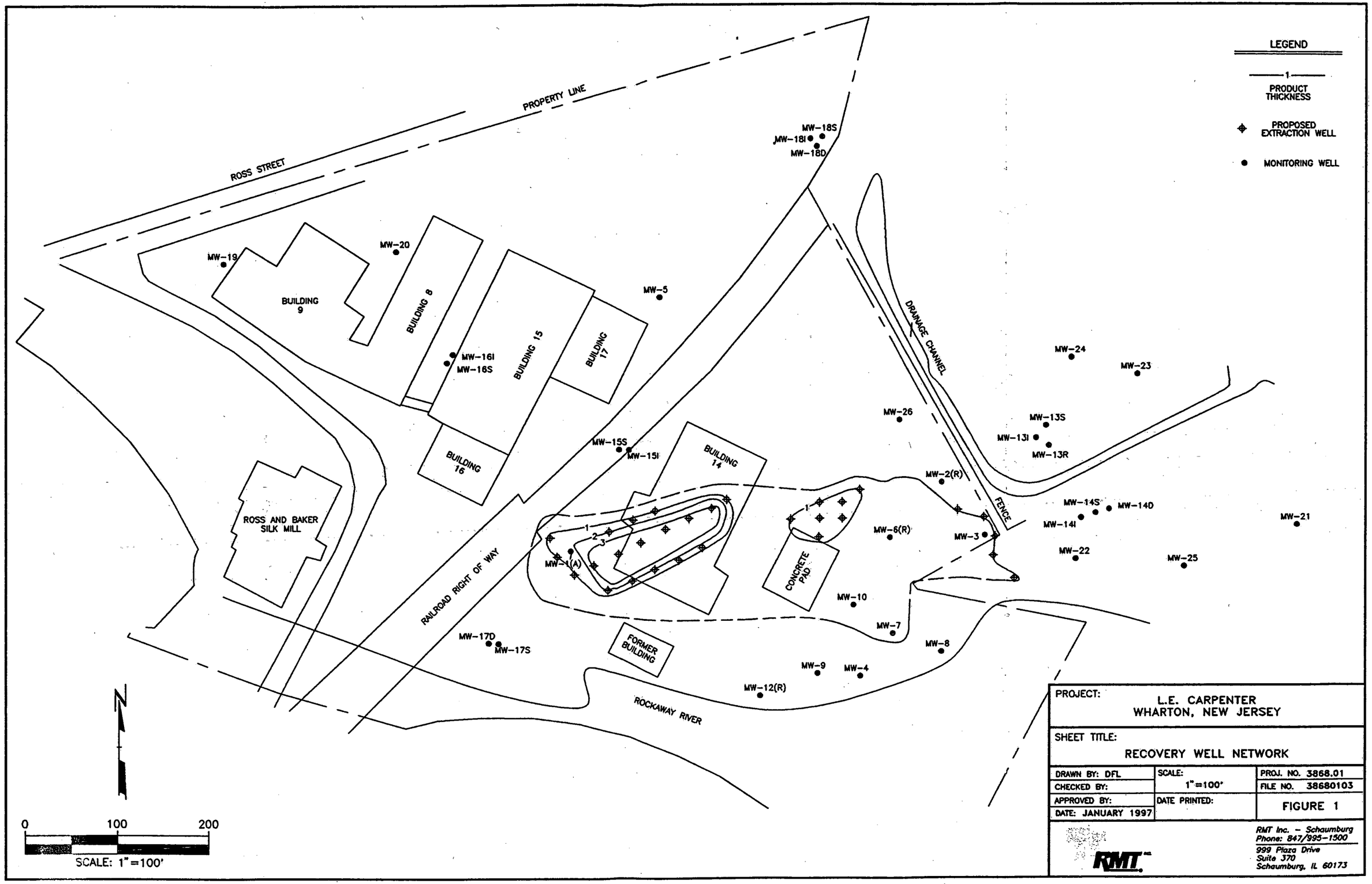
2.4 Soil Cuttings, Well Development Water, and Decontamination Water Disposal

All drilling and well development equipment will be decontaminated using high pressure washing prior to departing the site. Due to the presence of free product, decontaminating the drilling equipment between wells is not necessary and would add little to no benefit. Soil cuttings, decontamination water, and well development water generated during the recovery well installation activities will be placed in 55-gallon DOT-approved drums, sampled, and stored in a secure area pending off-site disposal.

2.5 Enhanced-Fluid Recovery

Free-product recovery activities will be accomplished by applying a vacuum to individual recovery wells using a vacuum truck capable of delivering 22-inches of mercury (Hg). The vacuum truck will be connected to the recovery well using a sanitary well seal and a 2-inch PVC, slotted drop pipe which extends from the well seal to the liquid level within the well. The sanitary well seal is designed to allow for a vacuum-tight seal as well as providing depth adjustments to the drop pipe. A 2-inch quick-connect aluminum fitting will be used to connect the well head to the truck's vacuum hose. Extracted liquid will be discharged directly to the vacuum truck's holding tank.

One of the key elements to successfully applying EFR at the L.E. Carpenter site is to minimize groundwater extraction while maximizing free-product recovery. The positioning of the drop pipe in relationship to the free product is critical for maximizing free product removal. Therefore, prior to initiating EFR activities, each recovery well will be gauged to determine the depth of the free-product/groundwater interface using an interface probe. A schematic of a typical EFR system is presented in Figure 3.



PROJECT:	L.E. CARPENTER WHARTON, NEW JERSEY
SHEET TITLE:	RECOVERY WELL NETWORK

DRAWN BY: DFL	SCALE: 1"=100'	PROJ. NO. 3868.01
CHECKED BY:		FILE NO. 38680103
APPROVED BY:	DATE PRINTED:	FIGURE 1
DATE: JANUARY 1997		

RMT Inc. – Schaumburg
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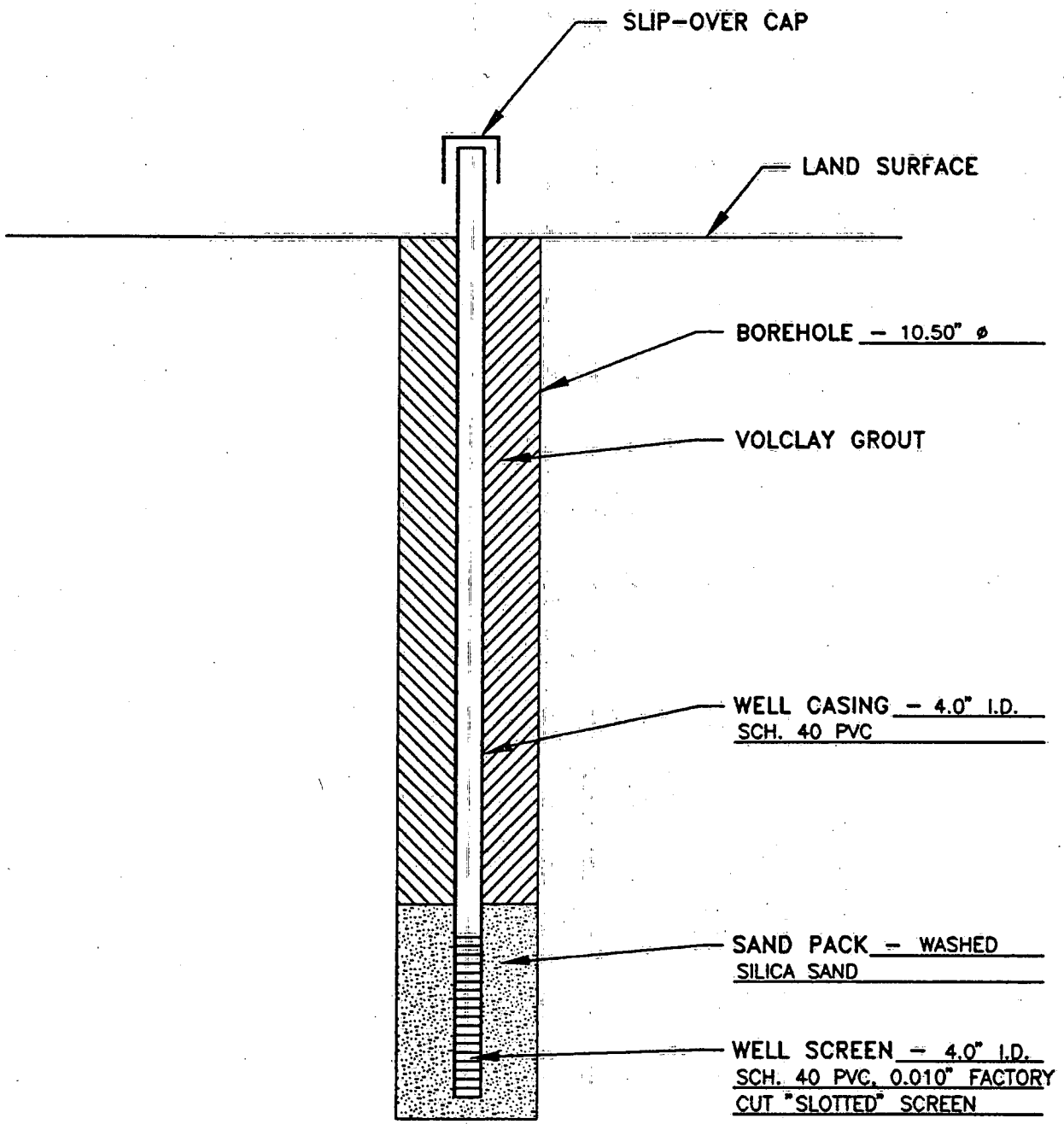
Suite 370
Schaumburg, IL 60173



PROJECT: L.E. CARPENTER WHARTON, NEW JERSEY		
SHEET TITLE: CONSTRUCTION DIAGRAM PRODUCT RECOVERY WELL		
DRAWN BY: DFL	SCALE:	PROJ. NO. 3868.01
CHECKED BY:	NOT TO SCALE	FILE NO. 38680102
APPROVED BY:	DATE PRINTED:	FIGURE 2
DATE: JANUARY 1997		

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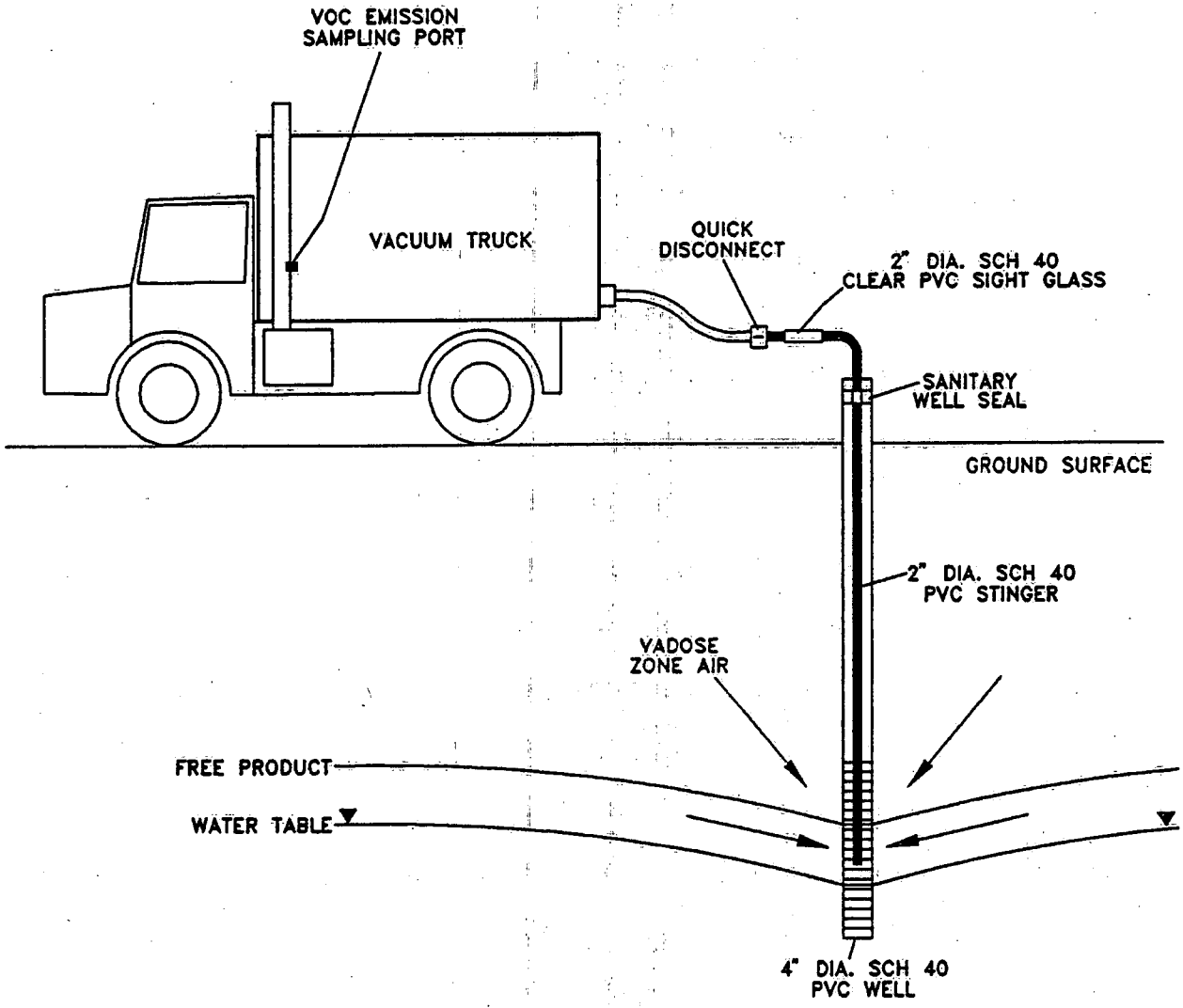

PROJECT: L.E. CARPENTER WHARTON, NEW JERSEY		
SHEET TITLE: ENHANCED FLUID RECOVERY SYSTEM SCHEMATIC		
DRAWN BY: DFL	SCALE:	PROJ. NO. 3868.01
CHECKED BY:	NOT TO SCALE	FILE NO. 38680101
APPROVED BY:	DATE PRINTED:	FIGURE 3
DATE: JANUARY 1997		

RMT Inc. – Schaumburg
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999 Plaza Drive
Suite 370
Schaumburg, IL 60173

2.6 Free-Product Treatment/Disposal

The recovered liquid will be transported to CycleChem of Elizabeth, New Jersey, for recycling. The liquid will be separated by CycleChem at their facility. The high-BTU portion will be transported to the Keystone Cement Kiln in Bath, Pennsylvania, where it will be combusted, and the impacted groundwater portion will be transported to the DuPont facility in Deepwater, New Jersey, for treatment.

2.7 Monitoring Well Abandonment Activities

It is proposed that monitoring wells MW-11i and MW-11d be abandoned in accordance will the requirements of New Jersey Administrative Code (NJAC) 7:9-9. Because the monitoring wells are located within the free-product plume, there is a potential for the intermediate and deep aquifers to be cross contaminated. The wells will be abandoned to prevent the potential of contaminating the intermediate and deep aquifers through inadequate well construction. Grout will be pressure tremied from the bottom of the well to the top. The well casing will be cut approximately 1-foot below grade and finished with a minimum 6-inch concrete seal. Well abandonment will be performed by a New Jersey licensed well driller and a well abandonment report will be submitted to the NJDEP.

Section 3

OPERATION AND MAINTENANCE PLAN

3.1 Product Recovery Activities

EFR events will be conducted twice a month for the first three months, once every three weeks for the next three months, and once per month for the next six months (i.e., a total of 16 EFR events for one year) in accordance with the operation and maintenance schedule presented in Table 1. The amount of free product being extracted is expected to decrease over time therefore it is anticipated that the frequency of EFR events will be reduced over time. The frequency of EFR events will be adjusted depending on the recovery that is obtained after an EFR event (rebound is defined as the rate of recovery of product measured in a well after an EFR event). In addition, product recovery data will also be used to determine which recovery wells will be included in the EFR recovery well network, i.e., recovery wells which exhibit greater recovery rates will be utilized on a more frequent basis while wells that no longer have significant measurable product (greater than a sheen) will be eliminated from the program.

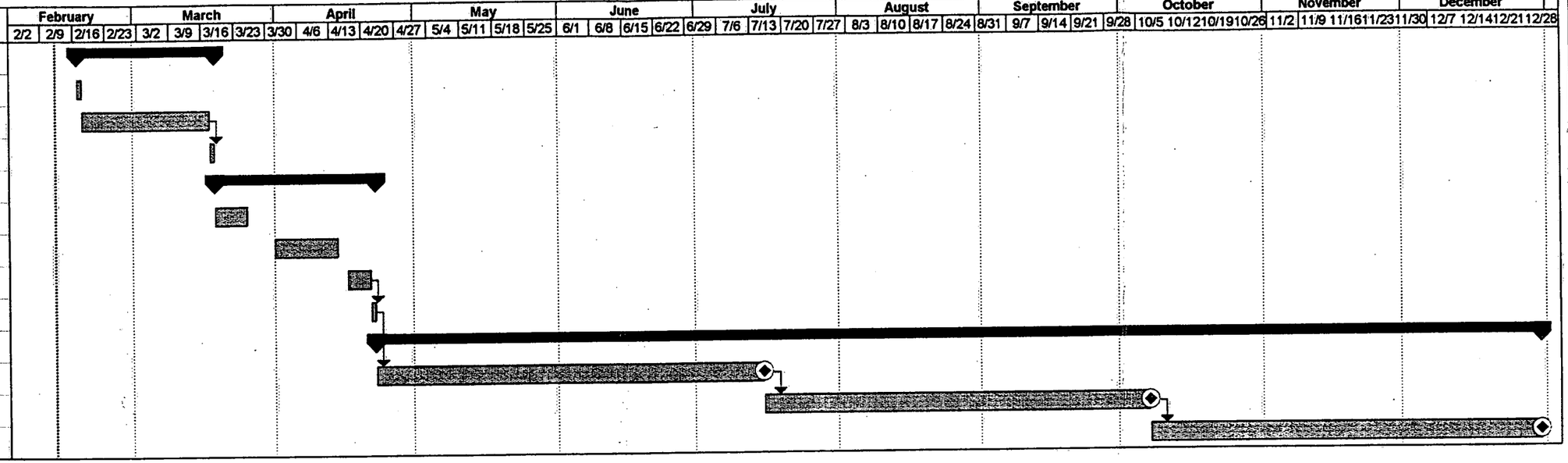
During each EFR event, RMT will collect and record the following data (a copy of the operation and maintenance field log is included in Appendix B);

- Depth to groundwater and free-product thickness will be determined before and after completing each EFR event. Subsequent measurements will be collected to determine the rate of recovery (rebound) of free product for each well used during the EFR event;
- Volume of free product which is removed;
- Volume of groundwater removed; and
- Vapor flow rate and vapor concentrations at each extraction well.

An Interphase Probe (IP) will be used to measure the depth to the free-product layer and to the top of the water table to determine the product thickness. The volume of free product which is removed will be measured using an IP to determine the thickness contained in the vacuum-truck tank. Furthermore, a velocity meter and a photoionization detector will be used to measure the velocity and the vapor concentration. These measurements will be used to calculate the volume of product removed in the vapor phase.

Table 1
Proposed EFR Schedule - L.E. Carpenter, Wharton, NJ

ID	Task Name
1	Phase I - Remedial Action Plan
2	Remedial Action Plan Submittal
3	Remedial Action Plan Review by NJDEP
4	NJDEP Approval
5	Phase I Implementation
6	Subcontractor Procurement
7	Recovery Well Installation
8	Well Development
9	IDW Disposal
10	Enhanced-Fluid Recovery (EFR) Implementation
11	Conduct Bi-Weekly EFR Events
12	Conduct EFR Events Every Third Week
13	Conduct Monthly EFR Events



Project: M.A. Hanna
Date: 2/5/97

Task
Progress
Quarterly Report
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

3.2 Free-Product Removal Reporting

RMT will prepare quarterly reports documenting the free-product removal process. The Free-Product Removal Reports will contain the following:

- The volume of free product removed;
- A contour map showing free-product thickness;
- Volume of free product removed;
- Graphs indicating time vs. volume of free product removed; and
- Copies of all waste manifests and shipping documents.

3.3 Construction Quality Assurance

A New Jersey licensed drilling subcontractor, waste hauler, and treatment facility will be retained to complete the Phase I free-product removal activities. The subcontractors will exercise an appropriate standard of care consistent with projects of this type.

Contractor activities in the field will be observed by RMT personnel. Specific quality control tasks by the RMT personnel will include the following:

- Documentation of well installation activities;
- Documentation of EFR activities;
- Documentation of well abandonment activities; and
- EFR data interpretation and recommendations for modifying free-product removal activities, if necessary.

Field activities will be documented in writing. Modifications to the work which are performed to adjust to field conditions will be documented.

3.4 Health and Safety

A site-specific health and safety plan has been developed by RMT and is included in Appendix C. The subcontractors shall be responsible for implementing the plan, directing the training of personnel, and for providing safety equipment and incidentals as required. At a minimum, the plan(s) will address the following:

- Chemical and physical hazard evaluation;
- Levels of protection; personal protective clothing and respiratory protection for persons performing closure activities, and criteria used to downgrade or upgrade protective equipment in response to environmental changes during closure;

- Air monitoring to ensure proper protective equipment for the conditions, including monitoring methods to be used;
- Standard safety operating procedures;
- Site control descriptions which delineate work zones, decontamination procedures for personnel and equipment, and site security measures;
- Contingency plan to deal with emergencies which include emergency contacts and emergency procedures; and
- Medical evaluation and certification and worker training and certification.

The plan is directed at compliance with applicable federal, state, and local requirements. The following references have been used to assist in the development of the site-specific health and safety plan:

- "Standard Operating Safety Guides," USEPA, November 1984, Chapter 9.
- "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," NIOSH/OSHA/USCG/EPA, October 1985.
- Free-product removal activities shall be conducted in accordance with U.S. Department of Labor, Occupational Safety and Health Standards and Regulations, including, but not limited to, 29 CFR 1910.120, 1910.132, 1910.133(a), 1910.134, 1910.135, 1910.136, 1910.1200, and 1926, Hazardous Waste Operations and Emergency Response.

APPENDIX A

SPECIFICATIONS

SECTION 02066
DISPOSAL OF IMPACTED GROUNDWATER AND FREE PRODUCT

PART 1 GENERAL

1.01 WORK INCLUDES

A. Remove only the impacted groundwater and free product generated during well development activities. This Contract does not include authorization to perform site remediation work.

B. Sample and analyze the liquid for proper disposal.

C. Dispose impacted water generated from well development and decontamination activities at the appropriate disposal facilities.

1.02 REFERENCES

A. USEPA "Methods for Chemical Analysis of Water and Wastes" EPA 600/4-79-020.

B. NFPA 30 - Flammable and Combustible Liquids Code.

1.03 SUBMITTALS

A. Submit copies of manifests to ENGINEER.

B. Submit laboratory test results to ENGINEER.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 PREPARATION

A. Conduct field characterization tests, where appropriate, to determine chemical compatibility.

B. Sample and laboratory-analyze unknown liquids (as required) for disposal authorization. Refer to USEPA Method EPA 600/4-79-020.

C. Determine the appropriate disposal method for liquids.

3.02 PROCEDURE

A. Pump liquid wastes into DOT-approved containers (if required).

B. At the CONTRACTOR's discretion, combine compatible wastes.

C. Conduct free product removal in a manner that minimizes the spread of contamination into previously uncontaminated zones by using recovery and disposal techniques appropriate to the hydrogeologic conditions at the site, and properly treat, discharge, or dispose recovery by-products in compliance with applicable local, state, and federal regulations.

D. Handle any flammable products in a safe and competent manner to prevent fires or explosions. Refer to NFPA-30.

E. Transport, manifest, and dispose liquids in accordance with federal and state regulations, and with local ordinances after authorization for disposal has been secured.

END OF SECTION

SECTION 02250
DISPOSAL OF IMPACTED SOIL

PART 1 GENERAL

1.01 WORK INCLUDES

A. Stockpile and dispose of impacted drill cuttings.

1.02 REFERENCES

A. 29 CFR 1926 - Safety and Health Standard Construction Industry.

B. 40 CFR 260 - 280 - Code of Federal Register.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 STOCKPILING

A. Locate stockpiles in area(s) indicated by the OWNER.

B. Place polyethylene sheeting (6-mil minimum) onto the ground surface adjacent to the excavation area for temporary stockpiling of excavated soils, and on surfaces where contaminated soils will be staged. Cover stockpile(s) with polyethylene at the completion of each Work day, or whenever precipitation is expected.

C. Secure stockpile area(s) as directed by OWNER.

3.02 DISPOSAL

A. Dispose of impacted soil at OWNER-selected landfill facility. OWNER will obtain proper permits to dispose.

B. Store, transport, and dispose impacted soil in accordance with 40 CFR 260-280 federal, state, and local laws and regulations.

C. Provide disposal certificates from disposal site(s), attesting to the quantity and acceptance of the contaminated or uncontaminated materials at the site(s).

END OF SECTION

SECTION 02670
WELL INSTALLATION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Install and develop thirty (30) free-product recovery wells.

1.02 REFERENCES

A. ASTM D1785 - Polyvinyl chloride (PVC) plastic pipe, Schedules 40, 80, and 120.

B. ASTM D1586 - Standard test method for penetration test and split-barrel sampling of soils.

PART 2 PRODUCTS

2.01 PVC CASING

A. PVC Material: ASTM D1785, Schedule 40.

B. Joints: Flush joined, threaded, with o-ring seals. No solvent welded joints below grade.

C. Fittings: Threaded bottom caps.

2.02 PVC SCREENS

A. PVC Material: ASTM D 1785, Schedule 40.

B. Screen: Factory cut 0.010-inch slot size.

C. Joints: Flush joined, threaded, with o-ring seals. No welded joints below grade.

2.03 SAND PACKS

A. Provide a clean, washed, durable material containing less than 5 percent by weight silt and clay, and free from organic matter.

B. Sand shall be a 60-65 size filter pack.

2.04 SEALS

A. Bentonite Seal: Organic-free, high-swelling, 100-percent prime bentonite, 3/8-inch diameter chips, hydrated with potable water.

2.05 WELLHEAD PROTECTION

A. Above grade completion: 4.0-inches, Schedule 40 PVC riser casing. Sealed with 4.0-inch diameter, Schedule 40 PVC slip-over cap.

PART 3 EXECUTION

3.01 PROTECTION

A. Identify locations of all utilities before drilling, and comply with federal, state, and local regulations.

APPENDIX B

OPERATION AND MAINTENANCE LOG SHEET

EFR Data Sheet

EXTRACTION TIMES			CONCENTRATION(ppm)			RECOVERY DATA				
Start Time	End Time	Total Time	Initial ppm	Ending ppm	Average ppm	Vacuum In. Hg	PPM	CFM*	lbs/hr	POUND
									TOTAL	0.00

Pounds Per Hour (lb/hr) = ppm_v (60 min./hr)x(CFM)(M.W.) / ($1x10^6$) x (379 ft^3 /lb-mole)

Where: ppm_v = parts per million by volume

Flow = Cubic Feet per Minute

M.W. = Molecular Weight(lb/lb-mole)

I.G.C. = Ideal Gas Constant (379 ft^3 /lb-mole)

Note: For Gasoline M.W = 75 grams/mole

For PCE M.W. = 165 grams/mole

*CFM Conversion Factor

Stack Dia.	Factor
3"	0.0491
4"	0.087
6"	0.1964

Date:_____

Location:_____

Method: EFR

Vac. Company:_____

_____

Operator:_____

Extraction Wells:_____

_____

Total Pounds Removed:_____

Equiv. Gals. of Product:_____

Total Gallons of Water:_____

Note: Gasoline is 6.26 lb/ gal

Client:_____

Project:_____

System Operator:_____

_____

RMT Inc.

APPENDIX C
SITE HEALTH AND SAFETY PLAN

SITE HEALTH AND SAFETY PLAN
PHASE I - FREE PRODUCT RECOVERY

L.E. CARPENTER AND COMPANY
WHARTON, NEW JERSEY

PREPARED FOR

L. E. CARPENTER & COMPANY
CLEVELAND, OHIO

PREPARED BY

RMT, INC.
SCHAUMBURG, ILLINOIS

FEBRUARY 1997

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James W. Van Nortwick, Jr., Ph.D., P.E.
Project Manager

Scott N. Irving
Health and Safety Coordinator

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

List of Figures

Section 1
INTRODUCTION

1.1 Background

RMT, Inc. (RMT), has been retained by L. E. Carpenter & Company (L. E. Carpenter) to perform free-product removal activities under the Phase I requirements of the Record of Decision (ROD) at the L.E. Carpenter Site (Site) located in Wharton, New Jersey. Free-product removal activities are described in the Remedial Action Plan (RAP) submitted to the New Jersey Department of Environmental Protection (NJDEP) in February, 1997.

The free-product removal activities include the drilling and installation of 30 product recovery wells throughout the eastern portion of the property. The wells will be installed on a grid basis in areas known to have measurable free product. The wells will be surveyed, developed, and used for the collection of product and static water level measurements. Free product will be removed using Enhanced Fluid Recovery (EFR) techniques. A more detailed site history can be found in Section 1 of the Remedial Action Plan.

Enhanced Fluid Recovery techniques involve the application of a high vacuum (typically between 18 to 26 inches of mercury) to individual recovery wells. A vacuum truck is used to apply the vacuum to the well head and contain the fluids recovered. A dedicated well drop pipe constructed of PVC piping is lowered into the free-product and connected to the vacuum truck. The applied vacuum removes total fluids (i.e., groundwater, free-product, and vapors) and facilitates free product removal by drawing free-product to the recovery well. The recovered free-product is then transported off-site for proper disposal.

The fieldwork addressed by this Site Health and Safety Plan (SHSP) is expected to be performed during spring of 1997 and covers only the recovery well installation and associated field activities (EFR events are not covered). Revisions to the final SHSP that may be required during the project will be distributed as sequentially numbered and dated addenda to this document.

1.2 Purpose

This SHSP provides the minimum guidelines and procedures to protect the health and safety of field personnel conducting the recovery well installation activities. Employees of subcontracted companies are required to work in accordance with their own independent Health and Safety Plans, provided that the minimum requirements of this SHSP are fulfilled. Site personnel participating in the fieldwork will be required to attend training on these guidelines and procedures before conducting or observing field activities.

This SHSP supplements information contained in the Remedial Action Plan. Personnel are expected to review both documents prior to participation in site activities.

A copy of both the SHSP and the Remedial Action Plan bound in a single three-ring binder will be kept in the RMT field support vehicle located on the L.E. Carpenter Site. They will be available for review by RMT personnel, subcontractors, government agents, and authorized visitors.

1.3 Scope

The SHSP is aimed specifically at protecting workers and authorized visitors from reasonably foreseeable health and safety hazards arising from the wastes known to be at the project site. Development of the SHSP is based upon information reviewed by RMT and provided by others. This plan is to be followed during the recovery well installation tasks conducted at the Site as specified in the RAP prepared by RMT. Details of the field activities and standard operating procedures for these activities are contained in Section 2 of the RAP.

The SHSP has been developed based on requirements and guidance contained in the following regulations and guidance documents:

- Occupational Safety and Health Administration (OSHA) Standards, 29 CFR 1910 and 1926, including 29 CFR 1910.120.
- Environmental Protection Agency (EPA) "Standard Operating Safety Guides," June 1992.
- NIOSH/OSHA/USCG/EPA "Occupational Safety & Health Guidance Manual for Hazardous Waste Site Activities," October 1985.

This plan is based on information available to date and is subject to revision as new data and information on potential health and safety hazards on the site become available.

1.4 Applicability

This SHSP applies to all site personnel who participate in the recovery well installation activities and to authorized visitors. This SHSP will be provided to RMT's subcontractors (i.e., surveying and drilling) for review and development of the subcontractor's health and safety plan. At a minimum, the SHSP guidelines and procedures shall be followed by all site personnel.

In addition, subcontractor and government agency personnel are responsible for the safety of their own personnel performing work related to these investigations. RMT's subcontractors are required to establish and implement a health and safety plan for their own employees that meets applicable regulatory requirements.

1.5 Organization and Coordination

The following RMT personnel are designated to carry out stated job functions related to the project:

- Project Manager — James W. Van Nortwick, Jr. Ph.D., P.E.
- Senior Project Engineer — Henry E. Adamiak
- Corporate Health and Safety Director — Christine Hansen
- Schaumburg Office Health and Safety Coordinator — Scott N. Irving
- RMT On-Site Health and Safety Representative (HSR) — Scott N. Irving
- Site Coordinator — Scott N. Irving

Each subcontractor performing work at the site shall also designate an on-site health and safety representative.

The RMT Project Manager will be responsible for the overall management of field activities, monitoring performance, and interfacing with L. E. Carpenter project representative, the Senior Project Engineer, the Health and Safety Coordinator, and representatives of the NJDEP.

The Health and Safety Coordinator will provide guidance for implementing the SHSP, review and audit health and safety procedures implemented during the field investigation, and revise the SHSP based on new information required. The Health and Safety Coordinator will perform the duties as requested by the Health and Safety Director. The Health and Safety Director will provide guidance for evaluating, planning, and implementing health and safety procedures to be used on site.

The RMT HSR will be on site while fieldwork is in progress and will also serve as the Site Coordinator. The HSR will be on-site at the beginning of the field activities to conduct the health and safety meeting. The SHSP guidelines and procedures will be reviewed, along with the overall project objectives and the project communication guidelines. The HSR will implement, monitor, observe and record, and modify the SHSP during implementation of the field activities.

The RMT HSR will have authority for implementing the SHSP, including shutting down operations if an imminent danger exists and for ensuring that procedures are followed by RMT site personnel. The RMT HSR will interface with the HSR's designated by each subcontractor performing field work to resolve potential health and safety issues that arise during the site work. If a health and safety issue cannot be resolved by the RMT HSR, the RMT HSR will seek input from the Project Manager and the Health and Safety Coordinator who will consult with the Health and Safety Director as necessary.

Section 2

FIELD PERSONNEL HEALTH AND SAFETY TRAINING AND MEDICAL SURVEILLANCE

2.1 Health and Safety Training

Prior to the start of field activities, RMT personnel conducting or observing on-site activities will participate in the following health and safety training sessions:

- Site Health and Safety Plan - The plan will be reviewed, and any special procedures will be outlined.
- Health and Safety for Hazardous Waste Site Activities - The 40-hour training session, as specified in 29 CFR 1910.120(e)(3).
- An annual 8-hour refresher course will be required for field personnel who have participated in the 40-hour training more than 1 year ago.
- An 8-hour additional health and safety training session for site managers and supervisors.

Training will also be provided to back-up field staff, so that personnel will be immediately available if there is an emergency at the site.

2.2 Medical Surveillance

RMT field personnel will receive an initial medical examination prior to performing their first field assignment and annually thereafter. The protocol for the yearly medical examination may include the following:

- Health history
- Vital signs and physical examination screen
- Pulmonary function
- Hematology survey
- Urinalysis
- Heavy metals screen
- Blood chemistry screen
- Vision test
- Hearing test

The initial examination may include a maximal stress treadmill exercise test with 12-point-lead EKG and a chest X-ray, in addition to the above annual tests. Field personnel assigned to conduct these investigations will have passed the required medical examination before entering the project site.

Section 3
HAZARD EVALUATION

3.1 Chemical Hazards

Detectable concentrations of organic compounds have been measured in previously collected soil and groundwater samples. The presence of a floating free-product layer has been measured in monitoring wells on-site.

3.1.1 Organic Compounds

The volatile organic compounds (VOCs) detected in previously collected soil and groundwater samples pose a potential health hazard to site workers. Potential routes of exposure to volatile organics include: 1) inhalation of gases or vapors, 2) accidental ingestion of free-product, impacted groundwater or soil, 3) dermal contact with free-product, impacted groundwater or soil, 4) absorption through skin, or 5) combination thereof.

Organic compounds determined to be present in soil and groundwater samples collected include toluene, ethylbenzene, xylene (TEX) and diethyl hexyl phthalate (DEHP). The composition of the free-product as determined by waste characterization analysis indicates a predominance of the above compounds.

Due to the relatively high volatility of the most prevalent compounds, the primary potential routes of exposure for personnel performing field investigation tasks at the site are inhalation of gases and vapors and accidental skin contact with impacted materials. Compounds such as toluene and xylene may also be absorbed through the skin. Accidental ingestion of impacted media or air borne particulates is also of concern.

3.2 Physical Hazards

For the field activities conducted during the recovery well installation, the greatest physical hazards expected are construction site slip, trip, and fall accidents. Additional physical hazards include operation of heavy machinery (drilling rig) and support vehicles.

Other hazards that could potentially be encountered are temperature extremes, utility interference's, and buried debris encountered during drilling. These hazards are addressed in the following sections. Field workers are expected to exercise caution to minimize the occurrence and potential danger from these hazards.

3.2.1 Temperature Extremes

The field investigations are expected to be performed in early spring of 1997. During this time, the normal ambient temperatures are moderate to cold. If temperatures drop below 20 degrees Fahrenheit as measured by the Wind-Chill index, thermal clothing may be required.

Persons working outdoors in low temperatures, especially at or below freezing, are subject to cold stress. Exposure to extreme cold for a short time causes severe injury to the surface of the body, or results in profound generalized cooling and may cause death. Areas of the body that have a high surface area-to-volume ratio, such as fingers, toes, and ears, are the most susceptible to injury.

Protective clothing generally does not afford protection against cold stress. In many instances, it increases susceptibility due to a reduction in Wind-Chill awareness and exposure to lower than perceived ambient temperatures.

Two factors influence the development of a cold injury; ambient temperature and the velocity of the wind. Wind-Chill is used to describe the chilling effect of moving air in combination with low temperature.

Frostbite

Local injury resulting from cold is included in the generic term frostbite. Frostbite of the extremities can be categorized into the following:

- Frost nip or incipient frostbite is characterized by sudden blanching or whitening of skin.
- Superficial frostbite is characterized by skin with a waxy or white appearance which is firm to the touch; the tissue beneath the skin, however, is resilient.

To administer first aid for frostbite, bring the victim indoors, and rewarm the frostbitten areas quickly in warm water. Never place frostbitten tissue in hot water, as the area will have a reduced heat awareness, and such treatment could result in burns. Give a warm drink, but not coffee, tea, or alcohol. The victim must not smoke. Keep the frostbitten parts in warm water or covered with warm clothes for 30 minutes, even though the tissue will be very painful as it thaws. Elevate the injured area and protect it from further physical injury. Do not allow blisters to be broken. Use sterile, soft, dry material to cover the injured areas. Keep the victim warm, and summon immediate medical assistance.

- Do not rub the frostbitten area (this may cause gangrene).

- Do not use ice, snow, gasoline, or anything cold on the frostbitten area.
- Do not use heat lamps or hot water bottles to rewarm the part.
- Do not place the part near a hot stove.

Hypothermia

Systemic hypothermia is caused by a cooling of the body's core temperature. Hypothermia is not just a problem under very cold conditions—cool, damp conditions above freezing can also cause hypothermia. Symptoms are usually exhibited in five stages as follows:

- Shivering
- Apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95 degrees Fahrenheit
- Unconsciousness, glassy stare, slow pulse, and slow respiratory rate
- Freezing of the extremities
- Death

Quick rewarming is essential. Bring the person into a warm room, and wrap him/her in warm blankets or additional warm clothing. Immediate medical assistance must be received.

Personnel will watch for signs of frostbite and cold exposure in themselves and team members.

Work schedules will be modified to include appropriate breaks to warm up if the equivalent chill temperature (°F) as shown on the Wind-Chill chart is below zero (°F). Support vehicles will be used for warm-up breaks and the schedule for breaks will be determined based on actual field conditions and their effect on site personnel.

The Wind-Chill chart shown on Figure 1 is from the ACGIH, Threshold Limit Values for Chemical Substances in the Work Environment for 1995-1996.

Figure 1 . Windchill Chart

Cooling Power of Wind on Exposed Flesh Expressed as Equivalent Temperature (under calm conditions)*

Estimated Wind Speed (in mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
Wind speeds greater than 40 mph have little additional effect	*LITTLE DANGER* For less than 1 hour with dry skin. Maximum danger of false sense of security.				*INCREASING DANGER* Danger from freezing of exposed flesh within 1 minute.			*GREAT DANGER* Flesh may freeze within 30 seconds.				
	Trenchfoot and immersion foot may occur at any point on this chart.											

*Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

3.2.2 Utilities

Prior to the installation of soil borings, all locations of overhead and underground process, electric, gas, water, and other utility lines must be determined to minimize physical hazards.

Proposed soil boring locations will be staked prior to mobilization of drilling rigs to the site. Proposed locations will be staked by the RMT Site Coordinator. On-site locations of the soil borings will be reviewed for utility clearances, and adjusted as required by representatives of the property owner and local utility companies. Adjustments will be based on accessibility to the proposed locations and the presence of underground utilities.

3.2.3 Drilling Activities

Operation of drilling equipment may present physical hazards due to noise and mechanical equipment. Field personnel shall exercise caution, and wear hard hats and hearing protection, while working in the vicinity of the drilling equipment. The drilling subcontractor will maintain an on-site copy of standard operating procedures for drilling activities.

Section 4
AIR MONITORING

4.1 Purpose

Air monitoring will be conducted to help ensure that the level of protection selected is adequate for all phases of the field investigation. The RMT HSR or designee will be responsible for air monitoring at the site for the safety of RMT personnel. Changes in the level of protection may be required if significant changes in airborne concentrations of contaminants occur. The RMT Project Manager will be notified of changes in level of protection.

4.2 Parameters

Total organic vapors and gases will be monitored using direct-reading equipment in the breathing zone of field personnel during recovery well installation activities. Explosive atmospheres will be monitored using a combustible gas indicator when deemed appropriate by the Site Coordinator.

4.3 Monitoring Equipment

A photoionization detector (PID) will be used as the primary instrument for routine monitoring of organic vapor concentrations. The PID detects organic vapors in air and provides a direct read-out of the organic concentrations as parts per million equivalent to isobutylene. The instrument will be calibrated before use in the field with span gas provided.

If determined to be necessary by the RMT HSR, air samples for organic vapors would be collected using SKC Model 224PCXR7 sampling pumps (or equivalent) and laboratory-supplied sampling media. The sampling flow rate will be calibrated before and after the sample period using a primary standard (a secondary standard that has recently been calibrated against a primary standard may also be used).

4.4 Monitoring Schedule

Air monitoring using the PID will be conducted at the beginning of each day when the project site is entered to establish background airborne concentrations. Monitoring will be continued throughout the field investigation tasks. The air monitoring will be conducted in the employee's breathing zone to determine potential exposure levels.

The site personnel performing the air monitoring will have been trained in monitoring procedures as stated in Subsection 2.1.

4.5 Establishing Background Levels of Air Contaminants at the Sampling Sites

Background air concentrations as equivalent parts per million of isobutylene measured with the PID will be established prior to initiating any site activity which requires air monitoring. This background level will be re-established if weather conditions change significantly or if industrial air emissions are significantly affecting sampling site air quality. If background concentration levels are found to present a potential health hazard, the levels of personal protection will be adjusted to provide protection from these additional exposures.

4.6 Response to Concentrations of Airborne Contaminants

If the PID detects significant concentrations of organic vapors and gases above background levels, the following general guidelines will be used by the RMT HSR as a part of the decision-making criteria for establishing the approximate level of protection:

- **Background to 10 parts per million (ppm) above background.** Level D protection as defined in Subsection 5.1.1 will be used.
- **10 ppm to 20 ppm above background.** Level C protection as defined in Subsection 5.1.2 will apply.
- **Greater than 20 ppm above background.** Personnel will leave the immediate area, and work will be suspended until the concentrations return to levels less than 10 ppm above background. If the levels persist, additional air sampling will be conducted to identify and quantify the air contaminants responsible for the excessive concentrations. After evaluation of the data, the RMT HSR may adjust the level of protection required (e.g., increase the level of protection to Level B) based on the nature and extent of the airborne substances present and the degree of hazard to which on-site personnel may be exposed.

4.7 Documentation

Air monitoring readings from direct-reading instruments will be recorded in the field log books with the date, time, location, operation, and concentration levels; any observations will also be noted. Readings of levels which may cause contaminants to become airborne by disturbing contaminated soil will be recorded prior to the start of field activities, and whenever there is a noticeable odor.

Section 5
LEVELS OF PROTECTION

5.1 Levels of Protection for Work Activities

In general, protective clothing must be worn whenever the potential exists for employees to come in contact with contaminated materials.

Work activities will be conducted under Level D or Level C protection based on the most current information available on potential health and safety hazards at the site.

5.1.1 Level D Protection

Based on an evaluation of the data and information available to date, it has been determined that field personnel can be adequately protected from potential health hazards by using Level D protection as long as significant airborne contaminant concentrations are not present. Hence, all fieldwork will be conducted under Level D protection unless the direct-reading instruments indicate that airborne organic concentrations are exceeding 10 ppm above background or if site conditions warrant additional protection in the judgment of the HSRs.

During on-site drilling activities, field personnel will wear the following protective clothing:

- Hard hat and hearing protection when working in the vicinity of the drill rig (both drillers and other field personnel)
- Steel-toe work boots will be worn at all times on-site
- Eye protection, safety glasses with side shields, splash goggles, or a full-face shield
- PVC or latex overboots or rubber steel-toe work boots whenever there is the potential for contact with contaminated soils
- Nitrile gloves during sampling activities and whenever there is the potential for contact with contaminated soil, water, or equipment
- Polylaminated Tyvek® suits or equivalent whenever there is the potential for body contact with contaminants (solid or liquid). When wearing protective suits, personnel shall duct tape the suit to both the outer gloves and boots.

5.1.2 Level C Protection: 10 ppm to 20 ppm Above Background

Level C requirements for field personnel protection include the protective clothing specified for Level D plus NIOSH/MSHA-approved air-purifying respirators equipped with combination organic vapor/HEPA cartridges that must be worn when working in Level C.

5.1.3 Level B Protection: Greater than 20 ppm Above Background

Level B protection requires that a self-contained breathing apparatus be worn. As stated in Section 4.6, if air contaminant concentrations exceed 20 ppm above background, work will stop until concentrations return to levels less than 10 ppm above background, or until the RMT Health and Safety Director determines that Level B protection is to be implemented and the required equipment has been obtained.

5.2 Changes in Levels of Protection

The RMT Health and Safety Director may authorize a change in the minimum level of protection required based on an evaluation of actual field conditions. The HSRs may increase levels of protection based on an evaluation of actual field conditions after consultation with the RMT Health and Safety Director.

New air monitoring data may reveal the presence of concentrations of organic vapors or other air contaminants above acceptable levels for the type of respiratory protection being used. If this occurs, the RMT Health and Safety Director will evaluate the need to modify the level of protection required in a particular area. If changes in the level of protection are warranted, the RMT Health and Safety Director will inform field personnel and the RMT Project Manager of the changes.

5.3 Work Limitations

- No eating, drinking, or smoking will be allowed in the exclusion or contamination reduction zones.
- All field personnel and equipment leaving the work zones must be properly decontaminated prior to leaving the site.
- A minimum of two persons will be on site during work activities.

Section 6
SITE CONTROL

6.1 Purpose

The purpose of site control is to minimize the transfer of contaminants from and within the project site. Two contamination control methods are as follows: establish work zones at the project site and decontaminate field personnel and equipment.

6.2 Work Zones

To prevent the spread of contaminants during the work, an exclusion zone, contamination reduction zone, and support zone will be delineated. Specific recovery well installation locations are included in the RAP.

6.2.1 Exclusion Zone

The exclusion zone is the zone where contamination does or could occur. During field activities at the project site, the immediate area surrounding the active drilling location is considered to be the exclusion zone. All personnel entering this zone must wear the required protective equipment.

Because the potential for exposure to contaminants will occur at each location, the boundary for each exclusion zone will be defined by the area required to perform the tasks. Field personnel will attempt to minimize the area required.

6.2.2 Contamination Reduction Zone

The contamination reduction zone is located between the exclusion and support zones. This is a transition between contaminated (or potentially contaminated) and clean areas and serves as a buffer to reduce the possibility of the clean area becoming contaminated and an area for employees and equipment to be decontaminated.

The contaminant reduction zone will consist of an appropriate area adjacent to the exclusion zone. The contaminant reduction zone will be field-located based on site features to allow sufficient area for decontamination of field personnel and equipment.

Decontamination of field personnel and equipment will be done in the contamination reduction zone, and will be subject to monitoring by the site HSRs.

Field personnel will wear the required personal protection while working in the contamination reduction zone. It is anticipated that activities in the contamination reduction zone will be conducted under Level D protection requirements, as outlined in Subsection 5.1.1. Protective equipment worn in the contamination reduction zone will be removed before entering the support zone.

6.2.3 Support Zone

The support zone is a noncontaminated or clean area. Support equipment (clean protective equipment, supplies, etc.) will be located in this zone, which will be the RMT support vehicle. Normal work clothing is appropriate in this zone.

The location of the support zone and any support facilities will be determined based on the following factors:

- Accessibility to the site.
- Available support services – electric power supply, roads, drinking water, etc.

6.3 Decontamination Procedures

6.3.1 Field Personnel

Decontamination procedures will be as follows:

- Protective disposable outer garments will be removed and placed in disposable plastic bags at the perimeter of the exclusion zone before each departure from the exclusion zone.
- If disposable outer boots are worn, they will be removed first and then outer gloves. If reusable rubber or neoprene boots are worn, they will be washed and rinsed before leaving the contamination reduction zone.
- Field personnel will wash and dry their hands and all exposed skin before leaving the contamination reduction zone.
- Disposable outer garments and other contaminated materials will be drummed on site for appropriate disposal.

Clean outer garments will be accessible to field personnel in an area free from potential contamination. Water, soap, and paper towels will also be kept in a clean location for both regular cleanup and emergency use.

6.3.2 Sampling Equipment

Sampling equipment to be used in the field will be decontaminated following standard procedures as required by the sampling methodology. Equipment to be decontaminated includes augers, split-spoons, and any other equipment that may come in contact with potentially impacted media. The sampling equipment will be decontaminated as detailed in Section 2.4 of the RAP.

6.4 Site Access

A site logbook will be maintained in the RMT support vehicle. All site personnel and visitors will be required to sign in when entering the site and sign out prior to leaving. Visitors and field personnel will also indicate in the logbook during sign in that they have read the appropriate sections of the RAP and all of the SHSP.

Footpaths entering the site will be barricaded during site activities to discourage unauthorized visitors. The barricade will consist of warning tape placed across the footpaths to the edge of the woods.

Vehicles left on site after hours will be locked to prevent tampering with investigative equipment when possible. Drums containing waste materials will be secured inside the fenced property and staged at a predetermined location. Drums or other containers will be sealed at the end of each work day.

Section 7
CONTINGENCY PLAN

7.1 Purpose

This Contingency Plan provides the emergency information needed should there be a sudden, life- or health-threatening situation where work activities are being conducted. The provisions of the Contingency Plan are to be implemented immediately in the event of a fire, explosion, or accident which could threaten human health or the environment. In the event of evacuation, RMT personnel will meet at northeast corner of the intersection of Ross Street and Main Street.

7.2 Communications

A mobile phone will be available in the RMT support vehicle if outside communications are necessary. It is expected that on-site communications will be conducted under normal operating conditions.

7.3 Emergency Contacts

Contacts and telephone numbers for use in emergency situations occurring during field activities are as follows:

• On-site L. E. Carpenter Representative Ken Redcliff	(201) 366-9577 (w)
• Police, Fire, and Ambulance	911
• Property Manager -David Condon	(201) 366-1050 (w)
• Dover General Hospital • Emergency Room	911 (201) 989-3200
• Property Owner, L. E. Carpenter Represented by Chris Anderson	(216) 589-4020 (w)
• RMT, Inc., Schaumburg Office	(847) 995-1500
• RMT, Inc., Madison Office • Health and Safety Director - Christine Hansen	(608) 831-4444 (608) 233-8486 (h)
• Project Manager - James W. Van Nortwick	(847) 995-1500 (w) (773) 348-8661 (h)
• Senior Project Engineer - Henry E. Adamiak	(847) 995-1500 (w)
• Health & Safety Coordinator - Scott N. Irving	(847) 995-1500 (w)
• On-Site Health and Safety Representative - Scott N. Irving	(847) 995-1500 (w)
• National Response Center (spills, chemical releases)	(800) 424-8802

- USEPA Region 2 Regional Number (212) 264-2525

- Notes:
  (h) - Home telephone number (m) - Mobile telephone number

7.4 Emergency Procedures

If an emergency situation develops at the site, the discoverer will take the following course of action:

- Notify the proper emergency services (fire, police, or ambulance) for assistance.
- Notify any other affected personnel at the site through the use of the two-way radios and the site emergency signal. The site emergency signal will consist of three honks of the horn on the nearest support vehicle.
- Contact the RMT Project Manager, Removal Action Coordinator, and Health and Safety Director to inform them of the incident as soon as possible.
- Prepare a written summary report of the incident for RMT and the Committees.

7.5 Emergency Equipment

Emergency equipment that will be on site with RMT field personnel will include the following:

- First-aid kit (in RMT vehicles)
- Clean water for emergency wash (in RMT vehicles)
- Fire extinguisher (on drill rig)

7.6 Route to the Hospital

A map showing the route from the facility to the medical center is shown on Figure 2. The exact physical location of the project site is 170 North Main Street, Borough of Wharton, Morris County, New Jersey. A copy of the map will be kept in the front seat of the RMT field vehicle. Directions to the hospital from the site are as follows:

- Exit site entrance and turn south (left) onto Main Street.
- Proceed approximately 1.3 miles south on Main Street (through town of Wharton) to Route 46 and turn east (left).
- Proceed approximately 0.25 miles (approximately two blocks) on Route 46 to Jardine Street and turn south (right) to the hospital. Hospital address is 24 Jardine Street.

Figure 2 presents the route from the facility to the hospital.

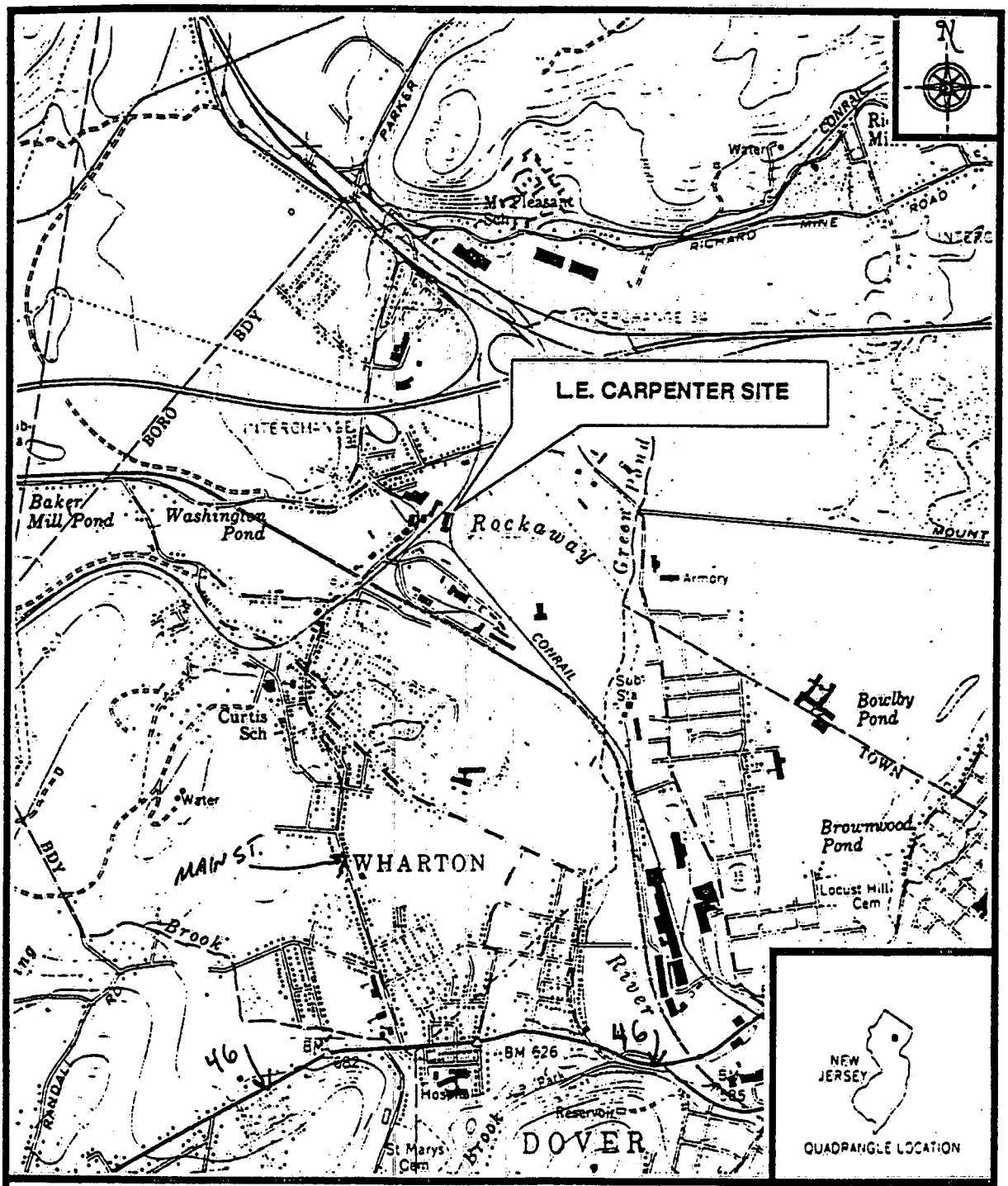

FIGURE 2

SITE LOCATION MAP AND EMERGENCY ROUTE TO HOSPITAL

L.E. CARPENTER SITE
WHARTON, NJ.

ADAPTED FROM WESTON